

## **REMARKS/ ARGUMENTS**

The Office Action of July 13, 2005 has been carefully reviewed and this response addresses the Examiner's concerns.

### **I. Status of the Claims**

Claims 1 and 3-21 are pending in the application.

Claims 1 and 3-21 are rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the invention.

Claims 1, 3-13, 18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouevitch (U.S. 2003/0021526) ("Bouevitch").

Claims 14-17 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouevitch in view of Shirasaki (U.S. 2002/0114090) ("Shirasaki").

Claims 1, 8 and 14 are amended in order to more clearly express the invention.

### **Support in the specification for the amendments**

Amended claims 1, 8 and 14 include the phrase, "wherein, in reflecting said distinct chromatic components, a direction of propagation of said distinct chromatic components is altered by means of diffraction by said holographic mirror; whereby, in reflecting said distinct chromatic components by means of diffraction, an angle of incidence does not equal an angle between a direction of propagation of said reflected distinct chromatic components and a normal to a surface of said holographic mirror, said reflected distinct chromatic components emanating from said surface," in order to more clearly express the invention. In Figures 1 through 4 of the present application, the Applicants show holographic mirrors in which the angle between a direction of propagation of the reflected distinct chromatic components and a normal to a surface of the holographic mirror emitting the reflected distinct chromatic components, usually referred to as the angle of reflection, is the negative of the angle of incidence, which is the opposite of a conventional mirror where the angle of reflection is equal to the angle of incidence (see, for example, any textbook in optics such as E. Hetch, *Optics*, ISBN 0-201-11609-X, pp. 83 and 154, a copy of which was provided in the response to the Final Office Action ). Holographic mirrors are described in col. 6, lines 13-23 of US Patent # 6,072,923, incorporated by reference in the Applicant's specification,

which states that " an input optical carrier signal" is "diffracted as in the case of a holographic mirror to follow one of the series of paths."

A holographic mirror to one of ordinary skill in the art refers to a reflection type hologram where the reflection is accomplished by diffraction of the incident radiation. (See, for example, J. R. Magariños, D. J. Coleman, *Holographic Mirrors*, Optical Engineering, Vol. 24(5), p. 770, 1985, a copy of which was enclosed in an Appendix to the response to the First Office Action. See also, for example, papers reprinted in *Selected Papers in Holographic and Diffractive Lenses and Mirrors*, edited by Thomas W. Stone and Brian J. Thompson, ISBN 0-8194-0637-6 ). Is a well-known, to one of ordinary skill in the art, that at a mirror, the angle of reflection of a reflected beam is equal to the angle of incidence of an input beam (see D. C. O'Shea, *Elements of Modern Optical Design*, ISBN 0-471-07796-8, pp.19-20, a copy of which is enclosed in the Appendix). It is also well known, to one skilled in the art, that in a reflection type volume hologram, by tilting the fringes, a reflection type hologram is obtained wherein the holographic mirror (the reflection type hologram) has reflection properties different from that of a conventional mirror, that is, the angle of incidence of the input beam (the angle between the direction of propagation of the input beam and a normal to the surface) is not equal to the angle between a direction of propagation of the emitted beam and a normal to the surface, the angle of reflection (see, for example, Figure 1D in S. C. Barden et al., "Volume-phase holographic gratings and their potential for astronomical applications," *Proceedings SPIE* vol. 3355, "Optical Astronomical Instrumentation" pp. 866-876, 1998, a copy of which is enclosed in the Appendix).

## II. The 35 U.S.C. §112 rejections

*Claims 1 and 3-21 are rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the invention.*

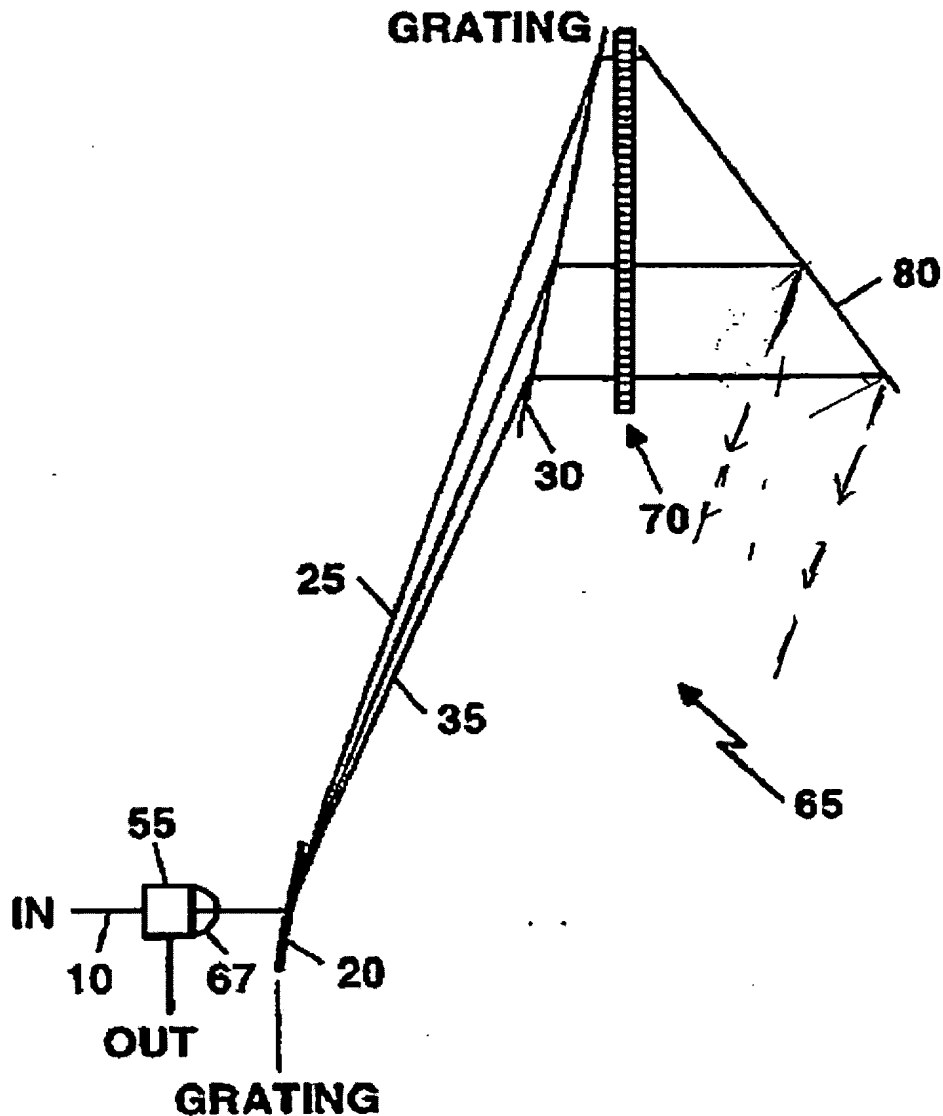
Since amended independent claims 1, 8 and 14 point out and claim the invention in a detail sufficient for one of ordinary skill in the art would understand what is claimed, Applicant respectfully traverses the 35 U.S.C. §112 rejections.

III. The 35 U.S.C. §103(a) rejections

*Claims 1, 3-13, 18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouevitch (U.S. 2003/0021526) ("Bouevitch").*

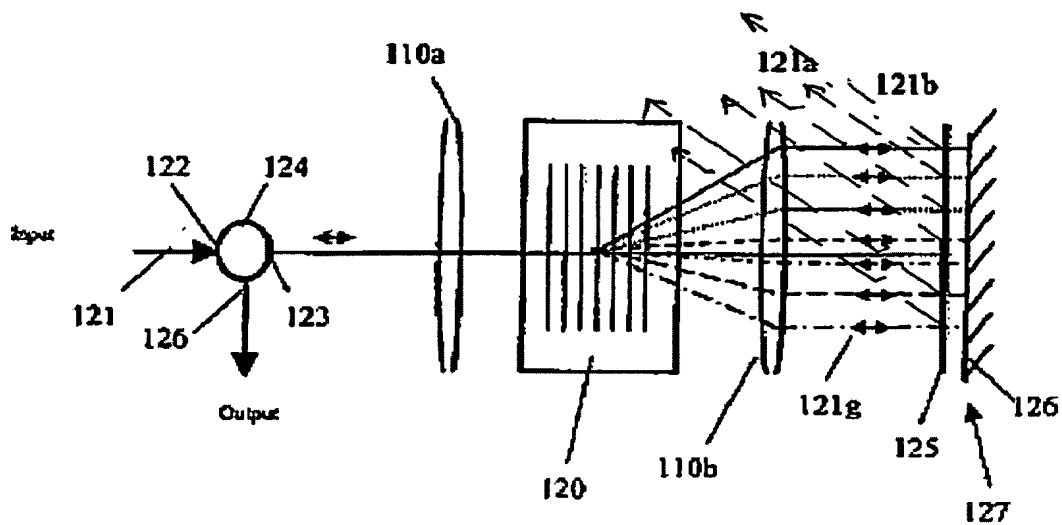
The Examiner states that the optical reflector in Bouevitch performs the same function as the holographic mirror, which has reflection properties different on a conventional mirror and where an angle of incidence of the input beam is not equal to the angle of reflection of the emitted (reflected) beam, and at the same result is obtained by using the optical reflector in Bouevitch asked by using the holographic mirror as in the Applicant's invention. Assuming that that statement is correct, one of ordinary skill in the art could replace the holographic mirror in the Applicant's invention with the optical reflector as in Bouevitch and still obtain a system performing as the system in the applicant's invention. Alternatively, one skilled in the art could replace the optical reflector in Bouevitch with the holographic mirror as in the Applicant's invention and still obtain a system performing as disclosed by Bouevitch.

Replacing the holographic mirror in the Applicant's invention with a conventional mirror, such as the optical reflector of Figure 1b in Bouevitch or the mirror in Figures 6a, 6b, or 7 in Bouevitch, renders the Applicant's invention not operable. For example, are shown in the figure below replacing the holographic mirror 80 in figure 2 of the Applicant's specification with a conventional mirror results in the reflected beams missing the grating 30 and therefore not being recombined (the dashed lines in the figure below indicate the direction of propagation of the beams reflected from a conventional mirror).

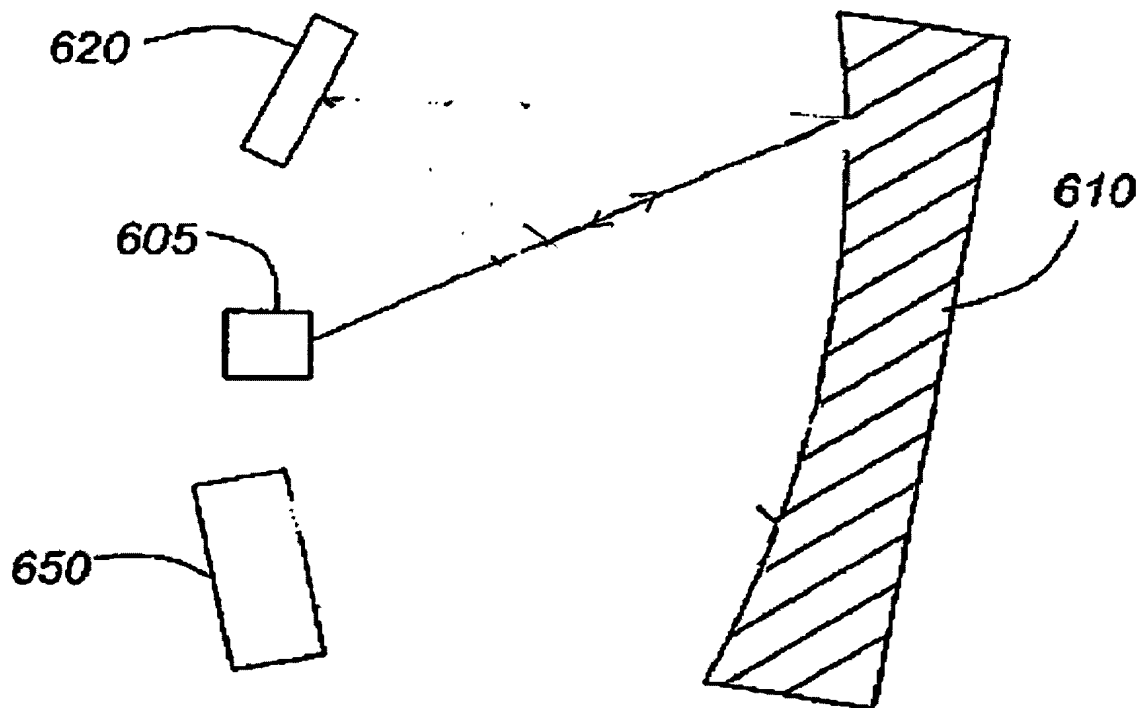


**FIG. 2**

Replacing the optical reflector in Figure 1b of Bouevitch with a holographic mirror, such as that used in the applicant's invention, also renders in the system disclosed by Bouevitch not operable for the purpose was intended for. Referring to the modified Figure 1b shown below, the reflected beams (shown by the dashed lines) will either miss the grating 120 or, if deflected by the mirror 110b, will be diffracted out of the system.



Similarly, replacing the mirror 610 in figure 7 of Bouevitch with a holographic mirror, such as that used in the Applicant's invention, also renders the system shown in Figure 7 of Bouevitch not operable, as shown in the figure below. The beam emanating from the source 605 would be reflected back into the source 605 and no light or energy will arrive at the element 650.



**FIG. 7**

Therefore, the Applicant respectfully asserts that the optical reflector or mirror in Bouevitch cannot be replaced by a volume holographic mirror as claimed the Applicant's invention.

The Examiner also states that, using MPEP section 2183 as support, the mirror of Bouevitch is an equivalent prior art element to a holographic mirror. The Examiner quotes section 2183 as stating, if "prior art element performs the identical function specified in the claim, and produces substantially the same results as the corresponding element disclosed in the specification," the prior art is an equivalent, citing *Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 54 USPQ2d 1308 (Fed. Cir. 2000). Applicants respectfully assert that the Examiner omitted (perhaps unintentionally) a section of the MPEP quote. Copying verbatim

from the MPEP section 2183 and from *Kemco Sales, Inc. v. Control Papers Co.*, the Applicants obtain the following quote (underline added), “the prior art element is an equivalent [are:] [if] [should (A)] the prior art element performs the identical function specified in the claim in substantially the same way, and produces substantially the same results as the corresponding element disclosed in the specification. *Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 54 USPQ2d 1308 (Fed. Cir. 2000). “ The function, way, result test that is stated in *Kemco Sales* is usually referenced back to the US Supreme Court opinion of *Graver Tank & Mfg. Co. v. Linde Air Products Co.*, 339 U.S. 605, 608 (1950). The function, way, result test, as stated in *Graver Tank*, allows a finding of equivalents if the device “performs substantially the same function in substantially the same way it to accomplish substantially the same result.” *Graver Tank.*, 339 U.S. at 608.

Applying the correct test, the volume holographic mirror, even assuming that it performs the same function (which, as shown above, it does not), does not operate in substantially the same way since it operates by diffraction rather than by reflection. Also, the volume holographic mirror does not produce the same result, since the angle of incidence is not equal to the angle of reflection in the volume holographic mirror, while in the mirror used in Bouevitch the angle of incidence equals the angle of reflection. (If the angle of incidence is not equal to the angle of reflection, the Bouevitch invention would be inoperable.) Therefore applying the correct function, way, result test, the volume holographic mirror is not equivalent to the mirror used in Bouevitch.

Applicants respectfully assert that since the optical reflector or mirror used in Bouevitch is not equivalent to the volume holographic mirror of the Applicant's claimed invention, where the volume holographic mirror has reflection properties different from a conventional mirror, and wherein, in reflecting the distinct chromatic components, a direction of propagation of the distinct chromatic components is altered by means of diffraction by the holographic mirror; and whereby, in reflecting the distinct chromatic components by means of diffraction, an angle of incidence does not equal an angle between a direction of propagation of the reflected distinct chromatic components and a normal to a surface of the holographic mirror, the reflected distinct chromatic components emanating from the surface, Bouevitch does not teach or suggest at least one distinct limitation of the Applicant's claimed invention of amended independent claims 1, 8, and 14.

Furthermore, Applicant respectfully asserts that there is no motivation to modify Bouevitch by replacing the conventional mirrors with holographic mirrors having reflection properties different from a conventional mirror, wherein, in reflecting the distinct chromatic components, a direction of propagation of the distinct chromatic components is altered by means of diffraction by the holographic mirror; and whereby, in reflecting the distinct chromatic components by means of diffraction, an angle of incidence does not equal an angle between a direction of propagation of the reflected distinct chromatic components and a normal to a surface of the holographic mirror, the reflected distinct chromatic components emanating from the surface, since that replacement would render the Bouevitch invention inoperable as shown above. If the references when combined would render the prior art invention being modified unsatisfactory for its intended purpose, there is no motivation to combine the references. *McGinley v. Franklin Sports, Inc.*, 262 F.3d at 1354; *In re Gordon*, 733 F.2d at 902. Therefore, there is no motivation to modify Bouevitch by replacing conventional mirrors with holographic mirrors such as those in the Applicant's claimed invention.

“To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.” (MPEP 2143)

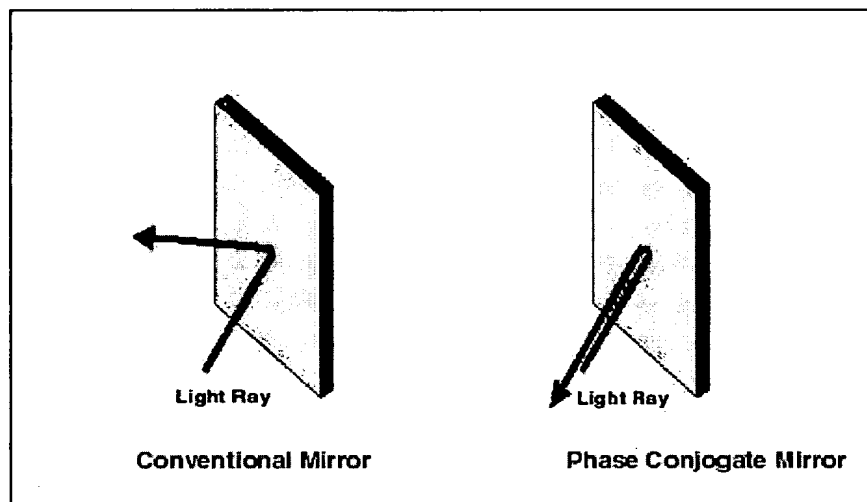
Since Bouevitch does not teach or suggest at least one distinct limitation of independent claims 1, 8 and 14 and since there is no motivation to replace the conventional mirrors in Bouevitch with the holographic mirror used in the applicants claimed invention, (There is also no reasonable expectation of success.) Applicant respectfully asserts that a *prima facie* case of obviousness has not been established.



Since claims 3-7 are dependent in claim 1, claims 9-13 are dependent on claim 8, and claims 18 and 21 are dependent on claim 14, Applicant respectfully states that a prima facie case of obviousness has not been established for claims 3-7, 9-13, and 18 and 21.

Furthermore, regarding claim 21, Applicant respectfully state that a phase conjugate mirror, as understood by one of ordinary skill in the art, retroreflects all incoming rays back to their origin (see, for example,

[http://www.photonics.cusat.edu/Research\\_Nonlinear%20Optics\\_OPC.html](http://www.photonics.cusat.edu/Research_Nonlinear%20Optics_OPC.html)). The figure below, illustrates the differences between conventional mirrors, such as those used in *Bouevitch* and phase conjugate mirrors.



If the mirror 610 in Figure 6a of *Bouevitch* were a phase conjugate mirror, the resulting system would be as in the modified Figure 7 previously discussed above. That is, light will be reflected back to the source 605 and the diffraction grating 620 and the modify means 650 would be render inoperable since no light will reach those components. Applicant respectfully states that *Bouevitch* does not teach or suggest a phase conjugate mirror. Furthermore, there would be no motivation to modify *Bouevitch* by replacing the mirror 610 with a phase conjugate mirror since it would render the resulting system inoperable.

Applicant respectfully asserts that a prima facie case of obviousness has not been established for claim 21.

Therefore, Applicant asserts that claims 1, 3-13, 18 and 21 are patentable over Bouevitch.

*Claims 14-17 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouevitch in view of Shirasaki (U.S. 2002/0114090) ("Shirasaki").*

As stated above, Bouevitch does not disclose a holographic mirror having reflection properties different from a conventional mirror, wherein, in reflecting the distinct chromatic components, a direction of propagation of the distinct chromatic components is altered by means of diffraction by the holographic mirror; and whereby, in reflecting the distinct chromatic components by means of diffraction, an angle of incidence does not equal an angle between a direction of propagation of the reflected distinct chromatic components and a normal to a surface of the holographic mirror, the reflected distinct chromatic components emanating from the surface. Shirasaki et al. do not disclose a holographic having reflection properties different from a conventional mirror, wherein, in reflecting the distinct chromatic components, a direction of propagation of the distinct chromatic components is altered by means of diffraction by the holographic mirror; and whereby, in reflecting the distinct chromatic components by means of diffraction, an angle of incidence does not equal an angle between a direction of propagation of the reflected distinct chromatic components and a normal to a surface of the holographic mirror, the reflected distinct chromatic components emanating from the surface. Therefore, combining Bouevitch. with Shirasaki et al. cannot be used to establish nor disclose a holographic mirror having reflection properties different from a conventional mirror, wherein, in reflecting the distinct chromatic components, a direction of propagation of the distinct chromatic components is altered by means of diffraction by the holographic mirror; and whereby, in reflecting the distinct chromatic components by means of diffraction, an angle of incidence does not equal an angle between a direction of propagation of the reflected distinct chromatic components and a normal to a surface of the holographic mirror, the reflected distinct chromatic components emanating from the surface.

As stated above, replacing the conventional mirrors in Bouevitch. with holographic mirrors having reflection properties different from a conventional mirror, wherein, in reflecting the distinct chromatic components, a direction of propagation of the distinct chromatic components is altered by means of diffraction by the holographic mirror; and whereby, in

reflecting the distinct chromatic components by means of diffraction, an angle of incidence does not equal an angle between a direction of propagation of the reflected distinct chromatic components and a normal to a surface of the holographic mirror, the reflected distinct chromatic components emanating from the surface, since that replacement would render the Bouevitch invention inoperable. Combining Bouevitch with Shirasaki et al. introduces diffraction gratings but does not render the resulting system operable if the conventional mirrors in Bouevitch are replaced with holographic mirrors having reflection properties different from a conventional mirror.

There is no motivation to replace the conventional mirrors in Bouevitch with holographic mirrors having reflection properties different from a conventional mirror, wherein, in reflecting the distinct chromatic components, a direction of propagation of the distinct chromatic components is altered by means of diffraction by the holographic mirror; and whereby, in reflecting the distinct chromatic components by means of diffraction, an angle of incidence does not equal an angle between a direction of propagation of the reflected distinct chromatic components and a normal to a surface of the holographic mirror, the reflected distinct chromatic components emanating from the surface and combining Bouevitch with Shirasaki et al. does not alter that lack of motivation.

Applicant also respectfully states that there is no motivation to combine Shirazaki with Bouevitch since the pair of separating diffraction gratings does not provide any additional compensation for chromatic dispersion.(See, for example, paragraph 8 in the Applicant's specification.)

Therefore, Applicant asserts that claims 14-17, and 19- 20 are patentable over Bouevitch in view of Shirasaki et al.

#### IV. Conclusion

In conclusion, in view of the above remarks, Applicant respectfully requests the Examiner find claims, 1 and 3- 21 as amended, allowable over the prior art and pass this case to issue.

No additional fees are required. However, if fees are required, they should be charged to Deposit Account No. 50-1078.

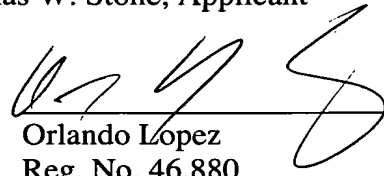
In accordance with Section 714.01 of the MPEP, the following information is presented in the event that a call may be deemed desirable by the Examiner:

JACOB N. ERLICH (617) 854-4000.

Respectfully submitted,  
Thomas W. Stone, Applicant

Dated: October 13, 2005

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